SONY

White paper

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Xperia™ ZL

C6502

Note: Screen images are simulated.

Purpose of this document

Sony product White papers are intended to give an overview of a product and provide details in relevant areas of technology.

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Sony Mobile Developer World

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Product overview

Xperia™ ZL – Experience the best of Sony in a smartphone

Say ‘so long’ to hum-drum and enter a bigger, brighter world. Xperia™ ZL sets a new standard of excellence, with an ultra-bold screen and fully loaded with years of Sony engineering. The 5” 1080 x 1920 full HD screen, created with the expertise of BRAVIA® TV engineers, brings you images so sharp, you feel like you’re really there. Running on Android 4.1, Jelly Bean, this smartphone helps you create the magic as well – with an advanced 13 megapixel fast capture camera that excels in any light. The real magic? How Sony designers and engineers came together to pack advanced smartphone technology into a phone that fits in your pocket. The amazingly compact 5” smartphone, with a maximised display and a very high screen to phone size ratio, Xperia™ ZL puts entertainment centre stage.

A screen as impressive as HDTV

Feel like you’re there with the razor sharp and super bright full HD screen. Xperia™ ZL brings you entertainment that’s bigger and closer than ever. Expertise from our BRAVIA® TV engineers goes into our mobile screens, to bring you the same quality you’d expect from a top quality HDTV.The 5” 1080 x 1920 full HD display has very high pixel density – 443 ppi—and superior brightness. That’s a lot of numbers that add up to mean unbelievably crisp and seriously bright, even in sunlight. The Reality Display™ with Mobile BRAVIA® Engine 2 uses the same contrast enhancement technology as the latest BRAVIA® TVs. Immerse yourself in your favourite game, a chat with your best mate, or watch the latest flick. Time to go? The OptiContrast™ panel makes the phone seamlessly, strikingly black when turned off.

Pushing the boundaries of design

Can you make the display bigger without increasing the phone size? Xperia™ ZL manages the design impossible: a display size that’s second to none, in a phone that fits your pocket. When creating Xperia™ ZL, Sony’s engineers optimised components architecture and layout, to increase display size while keeping the phone as small as possible. The result is an amazingly compact 5” smartphone, with a maximised display and very high screen to phone size ratio. What stands out instead of a large frame? Sharper, brighter entertainment that seems to overflow the phone in your hands.

Exmor RS™ for mobile – the world’s first image sensor with HDR video for smartphones

Torch-lit tent. Backlit peak. Midday beach. Now, with Xperia™ ZL, you can capture ultra-sharp photos and videos in any condition. Our smartphone camera modules use the same expertise and components as leading Sony cameras. And thanks to Exmor RS™ for mobile with next generation BSI sensors, you can take stunning shots in any light. With low-light capabilities on both front and back, Xperia™ ZL is the world’s first dual Exmor R™ for mobile camera. So what if the sun is shining right behind your subject? Xperia™ ZL, with HDR photos and HDR video, takes beautiful stills and movies in backlit conditions as well.

More interested in the moment and not a pro with settings? Superior Auto mode automatically activates HDR and noise reduction when they’re needed. Adopting the technology of luminance and colour noise reduction allows us to realize detailed results with low noise in challenging lighting conditions, and reproduces objects in more vivid colour. Your device is automatically optimised for 36 different scenes, so you always get the best shot. You focus on your target, the camera does the thinking.

Smartphone with super power

Forget load time. As fast as you can think it up, Xperia™ ZL can deliver. The Snapdragon™ S4 Pro quad-core 1.5 Ghz processor with 2GB RAM gives you super-fast performance and unparalleled graphics. But Xperia™ ZL is also made to use the battery wisely. Because the four cores are powered up and down as required, they only use the minimum power needed to complete a task. So you're not left high and dry. Find your way on Google Maps™. Stream the latest videos and YouTube™ clips. Download all the newest apps and run them without a hitch. Get it all when you want it – that would be now, right?

Share the magic on any screen

Home at last. Time to relax with the latest blockbuster? The "Movies" app magically downloads info on all the films that you have downloaded or side loaded, and lets you view them in high quality. Or why not play your videos on a big screen by connecting a standard HDMI cable to your HDTV using an MHL adapter* or a compatible Xperia TV Dock* accessory? With live streaming in full HD, what looks gorgeous on your phone also looks gorgeous on your HDTV. If you prefer to go wireless, you can use the Screen Mirroring** feature to share content from your phone via the TV***. With just the touch of a button, you can watch your selected photo pop up on the TV screen or listen to the current music track play on the TV's speakers.

** Separate accessory, not included.*

*** Your TV must support screen mirroring based on Wi-Fi CERTIFIED Miracast™ for the screen mirroring feature to work. If your TV does not support such screen mirroring, you need to purchase a wireless display adapter separately.*

**** When using screen mirroring, the image quality may sometimes be negatively impacted if there is interference from other Wi-Fi networks.*

Better battery life

With Battery STAMINA Mode you have more intelligent battery management and can easily improve your standby time by four times or more*. When the screen is off, your phone automatically shuts down the battery-draining apps you don't need, then starts them up again when the screen is back on. And of course, since you don't want to miss any important reminders or notifications, you can choose which apps to keep running even when the screen is off.

** Based on testing done with default settings, default accounts and applications for Skype™ and Twitter™ downloaded to the phone. The more applications installed, the greater the effect of Battery STAMINA Mode.*

Entertainment audio

Xperia™ ZL comes with a high quality stereo headset. Sony MH-EX300AP headset has superior acoustic performance which helps realize sound true to the original recorded sound.

Get the most out of your music, games and films. An in-ear headset that's designed for a premium comfort fit lets you enjoy quality entertainment audio. And when a call or message comes in, you'll know.

PlayMemories Online*. Enjoy anytime, anywhere.

Where are all your favourite shots? Spread out on Facebook™, your phone and your computer? Now you can carry every picture with you, without storing them all in your phone. PlayMemories Online lets you collect all your photos and videos in one place, then relive memories wherever you are. See the perfect shot? Upload pictures automatically over Wi-Fi® from your phone camera to PlayMemories Online. Then view your photos on any device – tablet, phone, computer, or BRAVIA® TV.

** PlayMemories Online is not available in every market.*

Game on!

In the mood for a brain teaser? Or are your fingers itching to do battle? With your PlayStation™Certified smartphone, you'll have direct access to PlayStation®Store for PlayStation®Mobile *, where you can browse a catalogue of great PlayStation®Mobile games developed for PlayStation®Mobile. So however you like to play, download something today and say bye-bye to boredom.

** PlayStation® Mobile is currently available in the US, Canada, Japan, UK, France, Italy, Germany, Spain and Australia only.*

Sony Entertainment Network* – anytime, anywhere

Download a movie or TV show from Video Unlimited. Connect your smartphone to your TV and the TV launcher pops up automatically. Enjoy millions and millions of songs from Music Unlimited. Enjoy all this and more from Sony Entertainment Network, with a common sign-on ID and digital wallet through your smartphone. It's the perfect fit for a life full of entertainment.

** Sony Entertainment Network with Video Unlimited and Music Unlimited is not available in every market. Separate subscription required. Additional terms and conditions apply*

Signature features

The Sony Xperia™ ZL comes with a range of features as standard. Below is a summary of the key signature features.

Xperia™ Local connectivity

More control over your media
Using Local connectivity, you can exercise more control over how media files get transferred and stored.

Xperia™ Home screen application

The place you call Home
Customise your Home screen with widgets, shortcuts, folders, themes, wallpaper and other items. Where's best for you? Email top right? Music player bottom left? You decide. With six extensions to your Home screen, you've got plenty of space to put things where you want. Just remember to flick left or right to find them. You can also add folders in the app tray/launcher.

Facts – dimensions, weight, performance and networks

Operating system	Google™ Android™ 4.1 (Jelly Bean)
	Google™ Android™ 4.2 (Jelly Bean)
Processor	1.5 GHz Qualcomm APQ8064 + MDM9215 Quad Core
GPU	Adreno 320
Size	131.7 x 69.8 x 9.8 mm
Weight	151 grams
Available colours	Black White
SIM card	Micro SIM
Main screen	
Colours	16,777,216 colour TFT
Resolution	1920x1080 pixels
Size (diagonal)	5.0 inches
Scratch-resistant	Shatter-proof sheet on scratch-resistant glass
Input mechanisms	
Text input	On-screen QWERTY keyboard
Touch screen	Capacitive
Touch gesture	Yes – multi-touch, up to 10 fingers supported
Memory	
RAM	2 GB
Flash memory	Up to 16 GB*
Expansion slot	microSD™ card, up to 32 GB (Android™ 4.1)
	microSD™ card, up to 64 GB (Android™ 4.2)
Camera	
Camera resolution	13 MP
Digital zoom	16x
Photo light	Yes – Pulsed LED
Video recording	Yes – HD 1080p
Front Camera	Yes – HD 1080p for video chat and 2 MP for camera capture
Sensors	

Accelerometer	Yes
Proximity sensor	Yes
Magnetometer	Yes
Gyroscope	Yes
Networks	
C6502/L35H	UMTS HSPA+ 850 (Band V), 900 (Band VIII), 1700 (Band IV), 1900 (Band II), 2100 (Band I) GSM GPRS/EDGE 850, 900, 1800, 1900
Data transfer speeds	
GSM GPRS	Up to 70.4 kbps (download). Up to 70.4 kbps (upload).
GSM EDGE	Up to 236.8 kbps (download). Up to 236.8 kbps (upload).
UMTS HSPA cat 24(download)	Up to 42 Mbps
UMTS HSPA cat 6 (upload)	Up to 5.76 Mbps
Hearing Aid Compatibility (HAC)	
M-Rating	M3
T-Rating	T3
Teletypewriter (TTY)	Yes – both HCO and VCO supported
Talk time (GSM)	Up to 10 hours**
Standby time (GSM)	Up to 500 hours**
Talk time (UMTS)	Up to 13 hours**
Standby time (UMTS)	Up to 500 hours**
Music listening time	Up to 40 hours**
Video playback time	Up to 5.5 hours**
Battery	2370 mAh (Built-in) typical 2300 mAh minimum

** Memory comprises of approximate 5 GB firmware, plus 11 GB of "Internal Storage" for downloaded applications, music, pictures and movies, and some application data. For more details about memory, see "Memory in Android™ phones" on page 20.*

*** Values are according to GSM Association Battery Life Measurement Technique as performed in controlled laboratory conditions. Actual time may vary.*

NOTE: Battery performance may vary depending on network conditions and configurations, and phone usage.

NOTE: Performance metrics measured under laboratory conditions.

Categorised feature list

Camera
13 MP
16x digital zoom
Aperture f/2.4
Auto focus
Burst Mode
HDR for both picture and video
Face detection
Flash/Pulsed LED
Flash/Photo light
Front-facing camera 2 MP (1080p video)
Geotagging
HD video recording (1080p)
Image stabiliser
Object tracking
Picture Effect
Red-eye reduction
Scene recognition
Self-timer
Send to web
Smile shutter
Sony Exmor RS™ for mobile image sensor
Superior Auto
Sweep Panorama
Touch capture
Touch focus
White balance

Music
3D surround sound (VPT)
Album art
Bluetooth™ stereo (A2DP)
ClearAudio+
Clear bass
Clear Phase™
Clear stereo
Dynamic normalizer
PlayNow™ service*
SensMe™
TrackID™ music recognition*
“WALKMAN” application
xLoud™ Experience

Internet
Bookmarks
Google Chrome™
Google Play™
Google™ search*
Google Voice™ Search*
Google Maps™ for Mobile with Street view and Latitude™*
NeoReader™ barcode scanner*
Pan & zoom
Web browser (WebKit™)

Communication
Call list
Facebook™ application*
Google Talk™ application*
Noise suppression
Polyphonic ringtones
Speakerphone
Twitter™ integration*

Messaging
Conversations
Email
Google Mail™*
Instant messaging
Multimedia messaging (MMS)
Predictive text input
Sound recorder
Text messaging (SMS)
Voice input

Design
Auto rotation
Face Unlock
Gesture input
On-screen QWERTY keyboard
Screenshot capturing
Touch screen
Wallpaper

** This service is not available in all markets.*

Entertainment

3D games
Media browser
Motion gaming
PlayStation® Certified
Radio (FM radio with RDS)
SensMe™ slideshow
Sony Entertainment Network*
TV launcher
Video streaming
YouTube™*

Organiser

Airplane mode
Alarm clock
Calculator
Calendar
Contacts
Document readers
eCompass™
Infinite button
Notes
Setup guide
Stopwatch
Timer

Connectivity

3.5 mm audio jack (CTIA)
aGPS*
Bluetooth™ 4.0 wireless technology
DLNA Certified®
GLONASS*
IR remote control
Media Go™
Media Transfer Protocol support
HDMI via MHL support
Micro USB support
Native USB tethering
NFC
Screen mirroring
PC Companion
Throw
Synchronisation via Exchange ActiveSync®
Synchronisation via Facebook™
Synchronisation via Google™
Synchronisation via SynchML™
USB charging
USB High speed 2.0 support
Wi-Fi®
Wi-Fi® Hotspot functionality

** This service is not available in all markets.*

Technologies in detail

NOTE: The information outlined below is general and levels of compliance to standards and specifications may vary between products and markets. For more information, contact Sony Mobile Developer World or your Sony contact person where applicable.

Device-to-device communications (local)

Bluetooth™ wireless technology

Bluetooth™ profiles supported	Advanced Audio Distribution Profile v1.2 Audio/Video Remote Control Profile v1.3 Handsfree Profile v1.6 (Wide band speech) Headset Profile v1.1 Object Push Profile v1.1 Phonebook Access Profile v1.0 Message Access Profile Host Interface Device Profile Health Device Profile 1.1 Generic Attribute Profile Client/Server over LE Proximity Monitor Profile over LE
Core version and supported core features	Version 4.0
Connectable devices	Products supporting at least one of the Bluetooth™ profiles. BT4.0 accessories generally require installation of a supporting application.

More information:

www.sonymobile.com/developer

www.bluetooth.com

Wi-Fi®

Supported standards	IEEE 802.11a/b/g/n and Wi-Fi® Wi-Fi Direct and Wi-Fi Protected Setup
Connectable devices	Wi-Fi® access points Wi-Fi Direct compatible devices
Frequency band	2.4 GHz/5 GHz
Data transfer rate	Up to 150 Mbit/s
Security	WEP Open Authentication WEP Shared Authentication WPA Personal and WPA2 Personal WPA Enterprise and WPA2 Enterprise EAP-SIM EAP-AKA EAP-TLS EAP-TTLS/MSCHAPv2 PEAPv0/EAP-MSCHAPv2 PEAPv1/EAP-GTC
Encryption	WEP 64 bit, WEP 128 bit, TKIP and CCMP (AES)
Power save	WMM-PS, IEEE-PS
QoS	WMM

DLNA Certified® (Digital Living Network Alliance)

Supported Device Classes	M-DMS – Mobile Digital Media Server Media Types: images, music and video Summary: The digital media server exposes the media files in your phone to a Wi-Fi® network. The files can then be accessed from other DLNA Certified® clients. +PU+ Media Types: image, video and music Summary: Play media in the phone on another device, such as a TV or computer using 2 box push technology. +PU+ is integrated in the Gallery and Music applications. M-DMP – Mobile Digital Media Player Media Types: image, video and music Summary: Play content stored on another device, for example, a server or a PC, directly on the phone. +DN+ Media Types: image, video and music Summary: Download content stored on another device, for example, a server or a PC, and play the downloaded content directly on the phone.
Supported Bearers	Wi-Fi®, Wi-Fi Direct
DRM Support	The DLNA Certified® implementation does not support DRM-protected content.

Messaging

MMS (Multimedia Messaging Service)

According to OMA Multimedia Messaging Service v1.0 + SMIL

Email

Bearer type (IP)	GPRS, EGPRS, UMTS
Character sets	BIG5 Traditional Chinese GB18030 ISO-2022-JP Japanese ISO-8859-1 ISO-8859-2 Eastern Europe ISO-8859-5 Cyrillic ISO-8859-7 Greek ISO-8859-9 Turkish ISO 8859-11 KOI8-R Cyrillic Shift_JIS Japanese USASCII UTF-16 UTF-8 Windows® 874 Windows® 1251 Cyrillic Windows® 1252 Windows® 1254 Turkish Windows® 1258 Vietnamese
Protocols	POP3 and IMAP4
Push email	Microsoft® Exchange ActiveSync® (EAS)
Secure email	SSL/TLS, both port methods (POPS/IMAPS) and START-TLS
HTML mail	Yes (read only)

More information:

www.sonymobile.com/developer

www.openmobilealliance.org

Positioning – location based services

Supported standards:

- OMA Secure User Plane Location (SUPL)
- 3GPP™ Control Plane location (incl. Emergency location)
- Qualcomm® GPSOneXtra™

Supported satellite systems:

- GPS
- GLONASS*

* NOTE*:* GPS and GLONASS are used together to calculate the position. Positioning is more robust and accurate in most conditions if both systems are active. In the conditions where the GLONASS receiver will not add any improvement, it is automatically disabled to save power. The benefits of using GLONASS are automatically available for all applications using the Satellite Positioning API (referred to "GPS Provider" in Android terminology).

Provisioning (OMA CP)

OMA CP version 1.1

Multimedia (audio, image and video)

Audio Playback	Decoder format	Supported in file format
	MP3	MP3 (.mp3), AVI (.avi, .xvid)
	AAC LC, HE-AAC v1, HE-AAC v2, AAC ELD	3GPP (.3gp), MP4 (.mp4), MKV (.mkv), MPEG-TS (.ts)
	AMR-NB, AMR-WB	3GPP (.3gp)
	General MIDI (GM)	SMF (.mid)
	Linear PCM, PCM/WAVE 8- and 16-bit	WAV (.wav), AVI (.avi), MKV (.mkv)
	Ogg vorbis	Ogg vorbis (.ogg)
	FLAC	FLAC (.flac)
Audio Recording	Encoder format	Supported in file format
	AMR-NB, AMR-WB	3GPP (.3gp), MP4 (.mp4), AMR (.amr)
	AAC-LC	3GPP (.3gp), MP4 (.mp4)
Image Playback	Decoder format	Supported in file format
	1, 4, 8, 16, 24 and 32 bpp and RLE encoded formats	BMP (.bmp)
	Single and multi-frame, bitmap mask support (GIF87a format and GIF89a format)	GIF (.gif)
	JPEG	JPEG (.jpg)
	PNG	PNG (.png)
Image Capture	Encoder format	Supported in file format
	JPEG	JPEG (.jpg)
Video Playback	Decoder format	Supported in file format
	MPEG-4 1080p (1920x1080) Advanced Simple Profile Level 5 20 Mbps at 30 fps	3GPP (.3gp), MP4 (.mp4), Matroska (.mkv), AVI (.avi, .xvid)
	H.264 1080p (1920x1080) High Profile level 4 20 Mbps at 30 fps	3GPP (.3gp), MP4 (.mp4) Matroska (.mkv), MPEG2-TS (.ts, AAC audio)
	H.263 Profile 0 Level 70	3GPP (.3gp), MPEG-4 (.mp4)
	VP8	WebM (.webm), Matroska (.mkv)

Video Recording	Encoder format	Supported in file format
	Video: H.263 Profile 0, H.264 1080p (1920x1080) High Profile Audio: AAC-LC stereo, AMR-NB	3GPP (.3gp), MP4 (.mp4)
Audio/Video Streaming	Streaming transport	RTSP, HTTP / HTTPS, HLS
DRM	DRM (Digital Rights Management) – features the rights and copy protection of downloaded content	OMA DRM 1.0 Marlin DRM

Synchronisation (OMA DS, EAS, Google Sync™)

OMA Data Synchronisation protocol versions 1.1.2 and 1.2

OMA Data Formats: vCard 2.1, vCalendar 1.0

Microsoft® Exchange ActiveSync® protocol version 2.5

Microsoft® Exchange ActiveSync® protocol version 12

Microsoft® Exchange ActiveSync® protocol version 12.1

Microsoft® Exchange ActiveSync® protocol version 14

Microsoft® Exchange ActiveSync® protocol version 14.1

Google Sync™

Related information:

www.sonymobile.com/developer

Web browser

Google™ Chrome for Android™ is pre-installed.*

Related information:

https://play.google.com/store/apps/details?id=com.android.chrome

** Google™ Chrome is not available for all markets.*

Memory in Android™ phones

To use Android phones efficiently, users should be aware of the different types of phone memory. This knowledge is important in order to understand, for example, where music, photos and videos are saved; how many apps can be downloaded from Google Play™; and how photos can be copied to a PC.

The below information is also of interest to developers who wants to make their programs able to make the best possible use of the resources in the phone.

Generally, all Android phones share the same basic memory setup. What differs is how much memory is available to you via the different types of memory, and whether your phone uses an external SD card or an internal memory chip. Any information specific to the particular phone model described in this White Paper is noted as such.

Types of memory

The types of memory described below are consistent with the terminology used in Sony mobile phone menus and in other content relating to 2013 Xperia™ phones:

1. Dynamic Memory (also known as RAM) is used by applications that run when the phone is turned on. The amount of Dynamic Memory influences how many applications and operating system services can run at the same time. In Android™, the operating system automatically closes applications and services that are not being used.

   However, such automatic functionality has limits. For example, if a lower amount of free RAM is available to applications after a new release of the operating system (due to increased capabilities in the system), phone speed will eventually be impacted (this is the main reason that a certain device cannot be indefinitely upgraded to newer releases of Android™).

   If you experience problems with RAM, for example, if the phone runs slower than usual or if the Home application restarts frequently when you leave an application, you should minimize the use of apps that run all the time. Such apps could include, for example, applications that frequently download social service updates. You could also consider using a static wallpaper instead of a live wallpaper.

   To see which apps and services are currently active, go to Settings > Applications > Running Services. You should have at least 50 MB, and ideally 100 MB or more, of free RAM to avoid slowdowns and application restarts.

   You should also be aware that if you update the phone to a later Android release, the load on the built-in Dynamic Memory will increase due to the addition of more features, as mentioned above. As a result, the phone may run slower after an update.

2. System Memory (also known as “System partition” or “/system”) is used for the Android OS and for most applications that are pre-loaded from the factory. This type of memory is normally locked, and can only be changed through a firmware upgrade. There is usually some free space available in this section of memory. However, since it is locked, you cannot save apps, photos or any other content to this memory. System Memory is reserved for future firmware upgrades, which almost always need more memory than the original firmware. You cannot see or influence the use of this memory.

3. Internal Storage is memory used as” working” memory. It can be compared to the C: drive on a PC or to the startup disk on a Mac.

   This memory is used to store all application downloaded from Google Play Store™ (and other sources) and their settings and data (such as emails, messages, calendar events and the like). All applications have an allocated area which no other applications can access and where the application data can be

stored.

Some games also stores content such as games music and level information outside their own designated area; and generally, any application can choose to save their data in locations of their own choosing (outside the protected application settings areas). Generally, such content is not deleted when an application is uninstalled but must be removed manually, by connecting the phone to a computer with a USB cable, or by the use of a file manager application.

Internal Storage is also used for all user content added, for example, as a result of the user taking photos with the camera, downloading media files, and performing file transfers. Typical user content includes:

- photos
- movies
- music
- downloaded documents (as email attachments, for example)

Internal Storage will tend to fill up as a result of normal usage: use of applications saving their data, downloading and installing new applications, downloading free or bought content and taking pictures and movies. Therefore, the larger this memory is from the start, the more applications you can download and use, and the more pictures and movies you can take.

If the Internal Storage starts to get full, the phone slows down, and in some cases it might no longer be possible to install more apps. You should always ensure that you have at least 100 MB of free Phone Memory. If not, you should consider removing some apps that you seldom use, or move content you do not frequently access to safe storage.

You can see approximately how much Internal Storage is free in Settings > Storage >Internal Storage. You can also view more detail about how much memory is used by applications in Settings > Applications > Manage Applications.

Please note that in Sony Mobile 2013 products, “Internal Storage” is now the union of what was previously known as “Phone Memory” (for applications and their data. “/data”) and “Internal Storage” (for user’s content, “/sdcard”). The reason for this change is to make the use of available memory more flexible, and also to enable the optional encryption of user’s content.

Memory card slot

In some products you may find both a large internal memory and a memory card reader slot. However, on the current Android platform, the card reader slot does not work in the same manner in a phone with large internal memory, as in a phone with ONLY a memory card slot.

Generally, since most applications expect only a single location of storage, such applications will not generally allow you to SAVE anything to the card (i.e. they will lack an option to choose storage location); however, some applications (for instance, the Sony Mobile “Camera” application) may actually allow you to do so. Other, for example backup applications such as the Sony Mobile “Memory” application, will by definition be configured to copy content from the Internal Storage to the external SD card.

On the other hand, when it comes to READING from an external SD Card, you will be able access content (videos, photos, music) on a memory card inserted in this slot without any special considerations since the Android system searches all available memory for content. Therefore, such products may be regarded as supporting a fourth type of memory, called “External Card”.

4. SD Card (known as "/ext_card" from a programmer's point of view, or by other names in other Android products) is the name for the removable SD memory card in all 2013 Sony Mobile products. As described above, this External Card memory is generally more limited in that any application can READ from it, but many applications cannot SAVE to this card. Only a few applications, including back-up applications and file manger applications, has the capability to save to this card.

Backing up data to different memory types
Generally, you should not save photos, videos and other personal content solely on the internal memory of a phone. If something should happen with the hardware, or if the phone is lost or stolen, the data stored on the phone's internal memory is gone forever.

In a phone where an SD card reader is the main memory, it is relatively easy to take the card out and copy all content to a PC or Mac, or to an entertainment device with a memory card slot. In a product featuring Internal Storage as the main memory, it is not possible to physically remove the memory. Instead, any critical or high-value content must either be copied to an external SD card by a special backup application, transferred to remote storage over a network (mobile or Wi-Fi), or to a computer via a USB cable.

To facilitate the transfer of data via a cable, the Xperia™ Z supports the Microsoft standard, Media Transfer Protocol (MTP), which makes it possible to easily transfer content back and forth between your phone and a Windows PC. For Apple Mac computers, a special application, BridgeforMac, is available offering built-in support for MTP; this application can be downloaded from the Xperia™ Z Support page.

Note that you do not need to back up or make a copy of applications that you have downloaded from Google Play™. They can normally be downloaded again if, once you have set up your Google account to work in a new phone phone (or a phone where the memory has been completely erased).

Note 1:
As noted above, some Android phones, including Sony Mobile devices from 2012, and Sony Ericsson devices from 2011 and earlier, do not use a single "Internal Storage" for both applications (and their data) and user content. Instead, these devices use either an external SD card for user content, or a corresponding area of internal memory to reproduce the functionality of an SD card. In such devices, there is a fixed limit between the application area ("/data") and the user content area ("/sdcard); with the result that user content can be filled, stopping the taking of new pictures for example, while there is still considerable free space in the application area; or vice versa, stopping the download and installation of new applications even though there is free memory in the content area.

Note 2:
Some devices with an integrated storage have abandoned the distinction between the application area and the content area when it comes to Factory Data Reset. As a result, there is no choice to do Factory Data Reset and preserve content; in such devices, all content is mandatorily and completely deleted from the device when a reset is performed.

In contrast, Sony Mobile has done the integration in a manner which makes it possible to preserve user content in this situation; therefore, when performing a Factory Data Reset, the default will still be to only remove applications and their data, and an option box must be checked if also all content is to be removed (as might be desirable when selling the device second-hand, for instance).

Note 3:
For a developer, it is important to note that from a programmer's point of view, the location names used to refer to the different memory areas described in Note 1 are still valid; i.e., the area used for application (/data) is still present, as is the area used for content (/sdcard).

In reality, “sdcard” is a so-called symbolic link to “/data/media”, but from inside an Android application, “/sdcard” can still be used (for instance, use “sdcard/DCIM/100Android” to find all camera images). Continuing to use /sdcard to access the content area ensures compatibility across different products and Android releases in this regard.

Trademarks and acknowledgements

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Visit *www.sonymobile.com* for more information.

SONY

White paper

January 2013

Xperia™ ZL/ZQ

C6503

Note: Screen images are simulated.

Purpose of this document

Sony product White papers are intended to give an overview of a product and provide details in relevant areas of technology.

Document history

Version		
January 2013	First released version	Version 1
January 2013	Second released version	Version 2
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Sony Mobile Developer World

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Product overview

Xperia™ ZL/ZQ – Experience the best of Sony in a smartphone

Say ‘so long’ to hum-drum and enter a bigger, brighter world. Xperia™ ZL/ZQ sets a new standard of excellence, with an ultra-bold screen and fully loaded with years of Sony engineering. The 5” 1080 x 1920 full HD screen, created with the expertise of BRAVIA® TV engineers, brings you images so sharp, you feel like you’re really there. Running on Android 4.1, Jelly Bean, this smartphone helps you create the magic as well – with an advanced 13 megapixel fast capture camera that excels in any light. The real magic? How Sony designers and engineers came together to pack advanced smartphone technology into a phone that fits in your pocket. The amazingly compact 5” smartphone, with a maximised display and a very high screen to phone size ratio, Xperia™ ZL/ZQ puts entertainment centre stage.

A screen as impressive as HDTV

Feel like you’re there with the razor sharp and super bright full HD screen. Xperia™ ZL/ZQ brings you entertainment that’s bigger and closer than ever. Expertise from our BRAVIA® TV engineers goes into our mobile screens, to bring you the same quality you’d expect from a top quality HDTV.The 5” 1080 x 1920 full HD display has very high pixel density – 443 ppi—and superior brightness. That’s a lot of numbers that add up to mean unbelievably crisp and seriously bright, even in sunlight. The Reality Display™ with Mobile BRAVIA® Engine 2 uses the same contrast enhancement technology as the latest BRAVIA® TVs. Immerse yourself in your favourite game, a chat with your best mate, or watch the latest flick. Time to go? The OptiContrast™ panel makes the phone seamlessly, strikingly black when turned off.

Pushing the boundaries of design

Can you make the display bigger without increasing the phone size? Xperia™ ZL/ZQ manages the design impossible: a display size that’s second to none, in a phone that fits your pocket. When creating Xperia™ ZL/ZQ, Sony’s engineers optimised components architecture and layout, to increase display size while keeping the phone as small as possible. The result is an amazingly compact 5” smartphone, with a maximised display and very high screen to phone size ratio. What stands out instead of a large frame? Sharper, brighter entertainment that seems to overflow the phone in your hands.

Exmor RS™ for mobile – the world’s first image sensor with HDR video for smartphones

Torch-lit tent. Backlit peak. Midday beach. Now, with Xperia™ ZL/ZQ, you can capture ultra-sharp photos and videos in any condition. Our smartphone camera modules use the same expertise and components as leading Sony cameras. And thanks to Exmor RS™ for mobile with next generation BSI sensors, you can take stunning shots in any light. With low-light capabilities on both front and back, Xperia™ ZL/ZQ is the world’s first dual Exmor R™ for mobile camera. So what if the sun is shining right behind your subject? Xperia™ ZL/ZQ, with HDR photos and HDR video, takes beautiful stills and movies in backlit conditions as well.

More interested in the moment and not a pro with settings? Superior Auto mode automatically activates HDR and noise reduction when they’re needed. Adopting the technology of luminance and colour noise reduction allows us to realize detailed results with low noise in challenging lighting conditions, and reproduces objects in more vivid colour. Your device is automatically optimised for 36 different scenes, so you always get the best shot. You focus on your target, the camera does the thinking.

Smartphone with super power

Forget load time. As fast as you can think it up, Xperia™ ZL/ZQ can deliver. The Snapdragon™ S4 Pro quad-core 1.5 Ghz processor with 2GB RAM gives you super-fast performance and unparalleled graphics. But Xperia™ ZL/ZQ is also made to use the battery wisely. Because the four cores are powered up and down as required, they only use the minimum power needed to complete a task. So you're not left high and dry. Find your way on Google Maps™. Stream the latest videos and YouTube™ clips. Download all the newest apps and run them without a hitch. Get it all when you want it – that would be now, right?

Share the magic on any screen

Home at last. Time to relax with the latest blockbuster? The "Movies" app magically downloads info on all the films that you have downloaded or side loaded, and lets you view them in high quality. Or why not play your videos on a big screen by connecting a standard HDMI cable to your HDTV using an MHL adapter* or a compatible Xperia TV Dock* accessory? With live streaming in full HD, what looks gorgeous on your phone also looks gorgeous on your HDTV. If you prefer to go wireless, you can use the Screen Mirroring** feature to share content from your phone via the TV***. With just the touch of a button, you can watch your selected photo pop up on the TV screen or listen to the current music track play on the TV's speakers.

** Separate accessory, not included.*

*** Your TV must support screen mirroring based on Wi-Fi CERTIFIED Miracast™ for the screen mirroring feature to work. If your TV does not support such screen mirroring, you need to purchase a wireless display adapter separately.*

**** When using screen mirroring, the image quality may sometimes be negatively impacted if there is interference from other Wi-Fi networks.*

Better battery life

With Battery STAMINA Mode you have more intelligent battery management and can easily improve your standby time by four times or more*. When the screen is off, your phone automatically shuts down the battery-draining apps you don't need, then starts them up again when the screen is back on. And of course, since you don't want to miss any important reminders or notifications, you can choose which apps to keep running even when the screen is off.

** Based on testing done with default settings, default accounts and applications for Skype™ and Twitter™ downloaded to the phone. The more applications installed, the greater the effect of Battery STAMINA Mode.*

Entertainment audio

Xperia™ ZL/ZQ comes with a high quality stereo headset. Sony MH-EX300AP headset has superior acoustic performance which helps realize sound true to the original recorded sound.

Get the most out of your music, games and films. An in-ear headset that's designed for a premium comfort fit lets you enjoy quality entertainment audio. And when a call or message comes in, you'll know.

PlayMemories Online*. Enjoy anytime, anywhere.

Where are all your favourite shots? Spread out on Facebook™, your phone and your computer? Now you can carry every picture with you, without storing them all in your phone. PlayMemories Online lets you collect all your photos and videos in one place, then relive memories wherever you are. See the perfect shot? Upload pictures automatically over Wi-Fi® from your phone camera to PlayMemories Online. Then view your photos on any device – tablet, phone, computer, or BRAVIA® TV.

** PlayMemories Online is not available in every market.*

Game on!

In the mood for a brain teaser? Or are your fingers itching to do battle? With your PlayStation™Certified smartphone, you'll have direct access to PlayStation®Store for PlayStation®Mobile *, where you can browse a catalogue of great PlayStation®Mobile games developed for PlayStation®Mobile. So however you like to play, download something today and say bye-bye to boredom.

** PlayStation® Mobile is currently available in the US, Canada, Japan, UK, France, Italy, Germany, Spain and Australia only.*

Sony Entertainment Network* – anytime, anywhere

Download a movie or TV show from Video Unlimited. Connect your smartphone to your TV and the TV launcher pops up automatically. Enjoy millions and millions of songs from Music Unlimited. Enjoy all this and more from Sony Entertainment Network, with a common sign-on ID and digital wallet through your smartphone. It's the perfect fit for a life full of entertainment.

** Sony Entertainment Network with Video Unlimited and Music Unlimited is not available in every market.* Separate subscription required. Additional terms and conditions apply

Signature features

The Sony Xperia™ ZL/ZQ comes with a range of features as standard. Below is a summary of the key signature features.

Xperia™ Local connectivity

More control over your media
Using Local connectivity, you can exercise more control over how media files get transferred and stored.

Xperia™ Home screen application

The place you call Home
Customise your Home screen with widgets, shortcuts, folders, themes, wallpaper and other items. Where's best for you? Email top right? Music player bottom left? You decide. With six extensions to your Home screen, you've got plenty of space to put things where you want. Just remember to flick left or right to find them. You can also add folders in the app tray/launcher.

Facts – dimensions, weight, performance and networks

Operating system	Google™ Android™ 4.1 (Jelly Bean)
	Google™ Android™ 4.2 (Jelly Bean)
Processor	1.5 GHz Qualcomm APQ8064 + MDM9215 Quad Core
GPU	Adreno 320
Size	131.7 x 69.8 x 9.8 mm
Weight	151 grams
Available colours	Black White
SIM card	Micro SIM
Main screen	
Colours	16,777,216 colour TFT
Resolution	1920x1080 pixels
Size (diagonal)	5.0 inches
Scratch-resistant	Shatter-proof sheet on scratch-resistant glass
Input mechanisms	
Text input	On-screen QWERTY keyboard
Touch screen	Capacitive
Touch gesture	Yes – multi-touch, up to 10 fingers supported
Memory	
RAM	2 GB
Flash memory	Up to 16 GB*
Expansion slot	microSD™ card, up to 32 GB (Android™ 4.1)
	microSD™ card, up to 64 GB (Android™ 4.2)
Camera	
Camera resolution	13 MP
Digital zoom	16x
Photo light	Yes – Pulsed LED
Video recording	Yes – HD 1080p
Front Camera	Yes – HD 1080p for video chat and 2 MP for camera capture
Sensors	

Accelerometer	Yes
Proximity sensor	Yes
Magnetometer	Yes
Gyroscope	Yes
Networks	
C6503	UMTS HSPA+ 850 (Band V), 900 (Band VIII), 2100 (Band I) GSM GPRS/EDGE 850, 900, 1800, 1900 LTE Band I, Band III, Band V, Band VII, Band VIII and Band XX
Data transfer speeds	
GSM GPRS	Up to 70.4 kbps (download). Up to 70.4 kbps (upload).
GSM EDGE	Up to 236.8 kbps (download). Up to 236.8 kbps (upload).
UMTS HSPA cat 6 (upload)	Up to 5.8 Mbps
UMTS HSPA cat 24(download)	Up to 42 Mbps
LTE cat 3 (download)	Up to 102 Mbps
LTE cat 3 (upload)	Up to 51 Mbps
Hearing Aid Compatibility (HAC)	
M-Rating	M3
T-Rating	T3
Teletypewriter (TTY)	Yes – both HCO and VCO supported
Talk time (GSM)	Up to 10 hours**
Standby time (GSM)	Up to 500 hours**
Talk time (UMTS)	Up to 13 hours**
Standby time (UMTS)	Up to 500 hours**
Standby time (LTE)	Up to 490 hours**
Music listening time	Up to 40 hours**
Video playback time	Up to 5.5 hours**
Battery	2370 mAh (Built-in) typical 2300 mAh minimum

** Memory comprises of approximate 5 GB firmware, plus 11 GB of "Internal Storage" for downloaded applications, music, pictures and movies, and some application data. For more details about memory, see "Memory in Android™ phones" on page 21.*

*** Values are according to GSM Association Battery Life Measurement Technique as performed in controlled laboratory conditions. Actual time may vary.*

NOTE: Battery performance may vary depending on network conditions and configurations, and phone usage.

NOTE: Performance metrics measured under laboratory conditions.

Categorised feature list

Camera
13 MP
16x digital zoom
Aperture f/2.4
Auto focus
Burst Mode
HDR for both picture and video
Face detection
Flash/Pulsed LED
Flash/Photo light
Front-facing camera 2 MP (1080p video)
Geotagging
HD video recording (1080p)
Image stabiliser
Object tracking
Picture Effect
Red-eye reduction
Scene recognition
Self-timer
Send to web
Smile shutter
Sony Exmor RS™ for mobile image sensor
Superior Auto
Sweep Panorama
Touch capture
Touch focus
White balance

Music
3D surround sound (VPT)
Album art
Bluetooth™ stereo (A2DP)
ClearAudio+
Clear bass
Clear Phase™
Clear stereo
Dynamic normalizer
PlayNow™ service*
SensMe™
TrackID™ music recognition*
“WALKMAN” application
xLoud™ Experience

Internet
Bookmarks
Google Chrome™
Google Play™
Google™ search*
Google Voice™ Search*
Google Maps™ for Mobile with Street view and Latitude™*
NeoReader™ barcode scanner*
Pan & zoom
Web browser (WebKit™)

Communication
Call list
Facebook™ application*
Google Talk™ application*
Noise suppression
Polyphonic ringtones
Speakerphone
Twitter™ integration*

Messaging
Conversations
Email
Google Mail™*
Instant messaging
Multimedia messaging (MMS)
Predictive text input
Sound recorder
Text messaging (SMS)
Voice input

Design
Auto rotation
Face Unlock
Gesture input
On-screen QWERTY keyboard
Screenshot capturing
Touch screen
Wallpaper

** This service is not available in all markets.*

Entertainment

3D games
Media browser
Motion gaming
PlayStation® Certified
Radio (FM radio with RDS)
SensMe™ slideshow
Sony Entertainment Network*
TV launcher
Video streaming
YouTube™*

Organiser

Airplane mode
Alarm clock
Calculator
Calendar
Contacts
Document readers
eCompass™
Infinite button
Notes
Setup guide
Stopwatch
Timer

Connectivity

3.5 mm audio jack (CTIA)
aGPS*
Bluetooth™ 4.0 wireless technology
DLNA Certified®
GLONASS*
IR remote control
Media Go™
Media Transfer Protocol support
HDMI via MHL support
Micro USB support
Native USB tethering
NFC
Screen mirroring
PC Companion
Throw
Synchronisation via Exchange ActiveSync®
Synchronisation via Facebook™
Synchronisation via Google™
Synchronisation via SynchML™
USB charging
USB High speed 2.0 support
Wi-Fi®
Wi-Fi® Hotspot functionality

** This service is not available in all markets.*

Technologies in detail

NOTE: The information outlined below is general and levels of compliance to standards and specifications may vary between products and markets. For more information, contact Sony Mobile Developer World or your Sony contact person where applicable.

Device-to-device communications (local)

Bluetooth™ wireless technology

Bluetooth™ profiles supported	Advanced Audio Distribution Profile v1.2 Audio/Video Remote Control Profile v1.3 Handsfree Profile v1.6 (Wide band speech) Headset Profile v1.1 Object Push Profile v1.1 Phonebook Access Profile v1.0 Message Access Profile Host Interface Device Profile Health Device Profile 1.1 Generic Attribute Profile Client/Server over LE Proximity Monitor Profile over LE
Core version and supported core features	Version 4.0
Connectable devices	Products supporting at least one of the Bluetooth™ profiles. BT4.0 accessories generally require installation of a supporting application.

More information:

www.sonymobile.com/developer

www.bluetooth.com

Wi-Fi®

Supported standards	IEEE 802.11a/b/g/n and Wi-Fi® Wi-Fi Direct and Wi-Fi Protected Setup, Wi-Fi Miracast
Connectable devices	Wi-Fi® access points Wi-Fi Direct compatible devices
Frequency band	2.4 GHz/5 GHz
Data transfer rate	Up to 150 Mbit/s
Security	Open Authentication Shared Authentication EAP-SIM EAP-AKA EAP-TLS EAP-TTLS/MSCHAPv2 PEAPv0/EAP-MSCHAPv2 PEAPv1/EAP-GTC WPA Personal and WPA2 Personal WPA Enterprise and WPA2 Enterprise
Encryption	WEP 64 bit, WEP 128 bit, TKIP and CCMP (AES)
Power save	WMM-UAPSD QoS, WMM

DLNA Certified® (Digital Living Network Alliance)

Supported Device Classes	M-DMS – Mobile Digital Media Server Media Types: images, music and video Summary: The digital media server exposes the media files in your phone to a Wi-Fi® network. The files can then be accessed from other DLNA Certified® clients. +PU+ Media Types: image, video and music Summary: Play media in the phone on another device, such as a TV or computer using 2 box push technology. +PU+ is integrated in the Gallery and Music applications. M-DMP – Mobile Digital Media Player Media Types: image, video and music Summary: Play content stored on another device, for example, a server or a PC, directly on the phone. +DN+ Media Types: image, video and music Summary: Download content stored on another device, for example, a server or a PC, and play the downloaded content directly on the phone.
Supported Bearers	Wi-Fi®
DRM Support	The DLNA Certified® implementation does not support DRM-protected content.

Messaging

MMS (Multimedia Messaging Service)

According to OMA Multimedia Messaging Service v1.0 + SMIL

Email

Bearer type (IP)	GPRS, EGPRS, UMTS
Character sets	BIG5 Traditional Chinese GB18030 ISO-2022-JP Japanese ISO-8859-1 ISO-8859-2 Eastern Europe ISO-8859-5 Cyrillic ISO-8859-7 Greek ISO-8859-9 Turkish ISO 8859-11 KOI8-R Cyrillic Shift_JIS Japanese USASCII UTF-16 UTF-8 Windows® 874 Windows® 1251 Cyrillic Windows® 1252 Windows® 1254 Turkish Windows® 1258 Vietnamese
Protocols	POP3 and IMAP4
Push email	Microsoft® Exchange ActiveSync® (EAS)
Secure email	SSL/TLS, both port methods (POPS/IMAPS) and START-TLS
HTML mail	Yes (read only)

More information:

www.sonymobile.com/developer

www.openmobilealliance.org

Positioning – location based services

Supported standards:

- OMA Secure User Plane Location (SUPL) v1.0 & v2.0
- 3GPP™ Control Plane location (incl. Emergency location)
- Qualcomm® GPSOneXtra™

Supported satellite systems:

- GPS
- GLONASS*

* NOTE*:* GPS and GLONASS are used together to calculate the position. Positioning is more robust and accurate in most conditions if both systems are active. In the conditions where the GLONASS receiver will not add any improvement, it is automatically disabled to save power. The benefits of using GLONASS are automatically available for all applications using the Satellite Positioning API (referred to "GPS Provider" in Android terminology).

Provisioning (OMA CP)

OMA CP version 1.1

Multimedia (audio, image and video)

Audio Playback	Decoder format	Supported in file format
	MP3	MP3 (.mp3), AVI (.avi, .xvid)
	AAC LC, HE-AAC v1, HE-AAC v2, AAC ELD	3GPP (.3gp), MP4 (.mp4), MKV (.mkv), MPEG-TS (.ts)
	AMR-NB, AMR-WB	3GPP (.3gp)
	General MIDI (GM)	SMF (.mid)
	Linear PCM, PCM/WAVE 8- and 16-bit	WAV (.wav), AVI (.avi), MKV (.mkv)
	Ogg vorbis	Ogg vorbis (.ogg)
	FLAC	FLAC (.flac)
Audio Recording	Encoder format	Supported in file format
	AMR-NB, AMR-WB	3GPP (.3gp), MP4 (.mp4), AMR (.amr)
	AAC-LC	3GPP (.3gp), MP4 (.mp4)
Image Playback	Decoder format	Supported in file format
	1, 4, 8, 16, 24 and 32 bpp and RLE encoded formats	BMP (.bmp)
	Single and multi-frame, bitmap mask support (GIF87a format and GIF89a format)	GIF (.gif)
	JPEG	JPEG (.jpg)
	PNG	PNG (.png)
Image Capture	Encoder format	Supported in file format
	JPEG	JPEG (.jpg)
Video Playback	Decoder format	Supported in file format
	MPEG-4 1080p (1920x1080) Advanced Simple Profile Level 5 20 Mbps at 30 fps	3GPP (.3gp), MP4 (.mp4), Matroska (.mkv), AVI (.avi, .xvid)
	H.264 1080p (1920x1080) High Profile level 4 20 Mbps at 30 fps	3GPP (.3gp), MP4 (.mp4) Matroska (.mkv), MPEG2-TS (.ts, AAC audio)
	H.263 Profile 0 Level 70	3GPP (.3gp), MPEG-4 (.mp4)
	VP8	WebM (.webm), Matroska (.mkv)

Video Recording	Encoder format	Supported in file format
	Video: H.263 Profile 0, H.264 1080p (1920x1080) High Profile Audio: AAC-LC stereo, AMR-NB	3GPP (.3gp), MP4 (.mp4)
Audio/Video Streaming	Streaming transport	RTSP, HTTP / HTTPS, HLS
DRM	DRM (Digital Rights Management) – features the rights and copy protection of downloaded content	OMA DRM 1.0 Marlin DRM

Synchronisation (OMA DS, EAS, Google Sync™)

OMA Data Synchronisation protocol versions 1.1.2 and 1.2

OMA Data Formats: vCard 2.1, vCalendar 1.0

Microsoft® Exchange ActiveSync® protocol version 2.5

Microsoft® Exchange ActiveSync® protocol version 12

Microsoft® Exchange ActiveSync® protocol version 12.1

Microsoft® Exchange ActiveSync® protocol version 14

Microsoft® Exchange ActiveSync® protocol version 14.1

Google Sync™

Related information:

www.sonymobile.com/developer

Web browser

Browser version	Android 4.1 Browser (Based on WebKit™)
Browser application	Bookmark synch Desktop mode Full page PC rendering Internet search Landscape/portrait rendering NFC link sharing Off-line reading Pan & Zoom
Search	Internet Search
Browser compliancy	CSS 2.0 CSS 2.1 CSS 3.0 DOM 2.0 DOM 3.0 HTML version. 4.0 HTML version. 5.0 JavaScript 1.7/ECMA-script 262 3rd edition WebGL 1.0 XHTML Basic version 1.0 XHTML 1.1 SVG 1.1
Supported Device API	Geo-location API Device orientation API File reader API Touch events API (including multi-touch)
Protocol compliancy	Gzip HTTP/1.1 OMA Download 1.0 TLS 1.0 and SSL 3.0

Related information:

www.sonymobile.com/developer

Memory in Android™ phones

To use Android phones efficiently, users should be aware of the different types of phone memory. This knowledge is important in order to understand, for example, where music, photos and videos are saved; how many apps can be downloaded from Google Play™; and how photos can be copied to a PC.

The below information is also of interest to developers who wants to make their programs able to make the best possible use of the resources in the phone.

Generally, all Android phones share the same basic memory setup. What differs is how much memory is available to you via the different types of memory, and whether your phone uses an external SD card or an internal memory chip. Any information specific to the particular phone model described in this White Paper is noted as such.

Types of memory

The types of memory described below are consistent with the terminology used in Sony mobile phone menus and in other content relating to 2013 Xperia™ phones:

1. Dynamic Memory (also known as RAM) is used by applications that run when the phone is turned on. The amount of Dynamic Memory influences how many applications and operating system services can run at the same time. In Android™, the operating system automatically closes applications and services that are not being used.

   However, such automatic functionality has limits. For example, if a lower amount of free RAM is available to applications after a new release of the operating system (due to increased capabilities in the system), phone speed will eventually be impacted (this is the main reason that a certain device cannot be indefinitely upgraded to newer releases of Android™).

   If you experience problems with RAM, for example, if the phone runs slower than usual or if the Home application restarts frequently when you leave an application, you should minimize the use of apps that run all the time. Such apps could include, for example, applications that frequently download social service updates. You could also consider using a static wallpaper instead of a live wallpaper.

   To see which apps and services are currently active, go to Settings > Applications > Running Services. You should have at least 50 MB, and ideally 100 MB or more, of free RAM to avoid slowdowns and application restarts.

   You should also be aware that if you update the phone to a later Android release, the load on the built-in Dynamic Memory will increase due to the addition of more features, as mentioned above. As a result, the phone may run slower after an update.

2. System Memory (also known as “System partition” or “/system”) is used for the Android OS and for most applications that are pre-loaded from the factory. This type of memory is normally locked, and can only be changed through a firmware upgrade. There is usually some free space available in this section of memory. However, since it is locked, you cannot save apps, photos or any other content to this memory. System Memory is reserved for future firmware upgrades, which almost always need more memory than the original firmware. You cannot see or influence the use of this memory.

3. Internal Storage is memory used as” working” memory. It can be compared to the C: drive on a PC or to the startup disk on a Mac.

   This memory is used to store all application downloaded from Google Play Store™ (and other sources) and their settings and data (such as emails, messages, calendar events and the like). All applications have an allocated area which no other applications can access and where the application data can be

stored.

Some games also stores content such as games music and level information outside their own designated area; and generally, any application can choose to save their data in locations of their own choosing (outside the protected application settings areas). Generally, such content is not deleted when an application is uninstalled but must be removed manually, by connecting the phone to a computer with a USB cable, or by the use of a file manager application.

Internal Storage is also used for all user content added, for example, as a result of the user taking photos with the camera, downloading media files, and performing file transfers. Typical user content includes:

- photos
- movies
- music
- downloaded documents (as email attachments, for example)

Internal Storage will tend to fill up as a result of normal usage: use of applications saving their data, downloading and installing new applications, downloading free or bought content and taking pictures and movies. Therefore, the larger this memory is from the start, the more applications you can download and use, and the more pictures and movies you can take.

If the Internal Storage starts to get full, the phone slows down, and in some cases it might no longer be possible to install more apps. You should always ensure that you have at least 100 MB of free Phone Memory. If not, you should consider removing some apps that you seldom use, or move content you do not frequently access to safe storage.

You can see approximately how much Internal Storage is free in Settings > Storage >Internal Storage. You can also view more detail about how much memory is used by applications in Settings > Applications > Manage Applications.

Please note that in Sony Mobile 2013 products, “Internal Storage” is now the union of what was previously known as “Phone Memory” (for applications and their data. “/data”) and “Internal Storage” (for user’s content, “/sdcard”). The reason for this change is to make the use of available memory more flexible, and also to enable the optional encryption of user’s content.

Memory card slot

In some products you may find both a large internal memory and a memory card reader slot. However, on the current Android platform, the card reader slot does not work in the same manner in a phone with large internal memory, as in a phone with ONLY a memory card slot.

Generally, since most applications expect only a single location of storage, such applications will not generally allow you to SAVE anything to the card (i.e. they will lack an option to choose storage location); however, some applications (for instance, the Sony Mobile “Camera” application) may actually allow you to do so. Other, for example backup applications such as the Sony Mobile “Memory” application, will by definition be configured to copy content from the Internal Storage to the external SD card.

On the other hand, when it comes to READING from an external SD Card, you will be able access content (videos, photos, music) on a memory card inserted in this slot without any special considerations since the Android system searches all available memory for content. Therefore, such products may be regarded as supporting a fourth type of memory, called “External Card”.

4. SD Card (known as "/ext_card" from a programmer's point of view, or by other names in other Android products) is the name for the removable SD memory card in all 2013 Sony Mobile products. As described above, this External Card memory is generally more limited in that any application can READ from it, but many applications cannot SAVE to this card. Only a few applications, including back-up applications and file manger applications, has the capability to save to this card.

Backing up data to different memory types
Generally, you should not save photos, videos and other personal content solely on the internal memory of a phone. If something should happen with the hardware, or if the phone is lost or stolen, the data stored on the phone's internal memory is gone forever.

In a phone where an SD card reader is the main memory, it is relatively easy to take the card out and copy all content to a PC or Mac, or to an entertainment device with a memory card slot. In a product featuring Internal Storage as the main memory, it is not possible to physically remove the memory. Instead, any critical or high-value content must either be copied to an external SD card by a special backup application, transferred to remote storage over a network (mobile or Wi-Fi), or to a computer via a USB cable.

To facilitate the transfer of data via a cable, the Xperia™ Z supports the Microsoft standard, Media Transfer Protocol (MTP), which makes it possible to easily transfer content back and forth between your phone and a Windows PC. For Apple Mac computers, a special application, BridgeforMac, is available offering built-in support for MTP; this application can be downloaded from the Xperia™ Z Support page.

Note that you do not need to back up or make a copy of applications that you have downloaded from Google Play™. They can normally be downloaded again if, once you have set up your Google account to work in a new phone phone (or a phone where the memory has been completely erased).

Note 1:
As noted above, some Android phones, including Sony Mobile devices from 2012, and Sony Ericsson devices from 2011 and earlier, do not use a single "Internal Storage" for both applications (and their data) and user content. Instead, these devices use either an external SD card for user content, or a corresponding area of internal memory to reproduce the functionality of an SD card. In such devices, there is a fixed limit between the application area ("/data") and the user content area ("/sdcard); with the result that user content can be filled, stopping the taking of new pictures for example, while there is still considerable free space in the application area; or vice versa, stopping the download and installation of new applications even though there is free memory in the content area.

Note 2:
Some devices with an integrated storage have abandoned the distinction between the application area and the content area when it comes to Factory Data Reset. As a result, there is no choice to do Factory Data Reset and preserve content; in such devices, all content is mandatorily and completely deleted from the device when a reset is performed.

In contrast, Sony Mobile has done the integration in a manner which makes it possible to preserve user content in this situation; therefore, when performing a Factory Data Reset, the default will still be to only remove applications and their data, and an option box must be checked if also all content is to be removed (as might be desirable when selling the device second-hand, for instance).

Note 3:
For a developer, it is important to note that from a programmer's point of view, the location names used to refer to the different memory areas described in Note 1 are still valid; i.e., the area used for application (/data) is still present, as is the area used for content (/sdcard).

In reality, “sdcard” is a so-called symbolic link to “/data/media”, but from inside an Android application, “/sdcard” can still be used (for instance, use “sdcard/DCIM/100Android” to find all camera images). Continuing to use /sdcard to access the content area ensures compatibility across different products and Android releases in this regard.

Trademarks and acknowledgements

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Visit *www.sonymobile.com* for more information.

SONY

White paper

January 2013

Xperia™ ZL

C6506

Note: Screen images are simulated.

Purpose of this document

Sony product White papers are intended to give an overview of a product and provide details in relevant areas of technology.

Document history

Version		
January 2013	First released version	Version 1
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Sony Mobile Developer World

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Product overview

Xperia™ ZL – Experience the best of Sony in a smartphone

Say ‘so long’ to hum-drum and enter a bigger, brighter world. Xperia™ ZL sets a new standard of excellence, with an ultra-bold screen and fully loaded with years of Sony engineering. The 5” 1080 x 1920 full HD screen, created with the expertise of BRAVIA® TV engineers, brings you images so sharp, you feel like you’re really there. Running on Android 4.1, Jelly Bean, this smartphone helps you create the magic as well – with an advanced 13 megapixel fast capture camera that excels in any light. The real magic? How Sony designers and engineers came together to pack advanced smartphone technology into a phone that fits in your pocket. The amazingly compact 5” smartphone, with a maximised display and a very high screen to phone size ratio, Xperia™ ZL puts entertainment centre stage.

A screen as impressive as HDTV

Feel like you’re there with the razor sharp and super bright full HD screen. Xperia™ ZL brings you entertainment that’s bigger and closer than ever. Expertise from our BRAVIA® TV engineers goes into our mobile screens, to bring you the same quality you’d expect from a top quality HDTV.The 5” 1080 x 1920 full HD display has very high pixel density – 443 ppi—and superior brightness. That’s a lot of numbers that add up to mean unbelievably crisp and seriously bright, even in sunlight. The Reality Display™ with Mobile BRAVIA® Engine 2 uses the same contrast enhancement technology as the latest BRAVIA® TVs. Immerse yourself in your favourite game, a chat with your best mate, or watch the latest flick. Time to go? The OptiContrast™ panel makes the phone seamlessly, strikingly black when turned off.

Pushing the boundaries of design

Can you make the display bigger without increasing the phone size? Xperia™ ZL manages the design impossible: a display size that’s second to none, in a phone that fits your pocket. When creating Xperia™ ZL, Sony’s engineers optimised components architecture and layout, to increase display size while keeping the phone as small as possible. The result is an amazingly compact 5” smartphone, with a maximised display and very high screen to phone size ratio. What stands out instead of a large frame? Sharper, brighter entertainment that seems to overflow the phone in your hands.

Exmor RS™ for mobile – the world’s first image sensor with HDR video for smartphones

Torch-lit tent. Backlit peak. Midday beach. Now, with Xperia™ ZL, you can capture ultra-sharp photos and videos in any condition. Our smartphone camera modules use the same expertise and components as leading Sony cameras. And thanks to Exmor RS™ for mobile with next generation BSI sensors, you can take stunning shots in any light. With low-light capabilities on both front and back, Xperia™ ZL is the world’s first dual Exmor R™ for mobile camera. So what if the sun is shining right behind your subject? Xperia™ ZL, with HDR photos and HDR video, takes beautiful stills and movies in backlit conditions as well.

More interested in the moment and not a pro with settings? Superior Auto mode automatically activates HDR and noise reduction when they’re needed. Adopting the technology of luminance and colour noise reduction allows us to realize detailed results with low noise in challenging lighting conditions, and reproduces objects in more vivid colour. Your device is automatically optimised for 36 different scenes, so you always get the best shot. You focus on your target, the camera does the thinking.

Smartphone with super power

Forget load time. As fast as you can think it up, Xperia™ ZL can deliver. The Snapdragon™ S4 Pro quad-core 1.5 Ghz processor with 2GB RAM gives you super-fast performance and unparalleled graphics. But Xperia™ ZL is also made to use the battery wisely. Because the four cores are powered up and down as required, they only use the minimum power needed to complete a task. So you're not left high and dry. Find your way on Google Maps™. Stream the latest videos and YouTube™ clips. Download all the newest apps and run them without a hitch. Get it all when you want it – that would be now, right?

Share the magic on any screen

Home at last. Time to relax with the latest blockbuster? The "Movies" app magically downloads info on all the films that you have downloaded or side loaded, and lets you view them in high quality. Or why not play your videos on a big screen by connecting a standard HDMI cable to your HDTV using an MHL adapter* or a compatible Xperia TV Dock* accessory? With live streaming in full HD, what looks gorgeous on your phone also looks gorgeous on your HDTV. If you prefer to go wireless, you can use the Screen Mirroring** feature to share content from your phone via the TV***. With just the touch of a button, you can watch your selected photo pop up on the TV screen or listen to the current music track play on the TV's speakers.

** Separate accessory, not included.*

*** Your TV must support screen mirroring based on Wi-Fi CERTIFIED Miracast™ for the screen mirroring feature to work. If your TV does not support such screen mirroring, you need to purchase a wireless display adapter separately.*

**** When using screen mirroring, the image quality may sometimes be negatively impacted if there is interference from other Wi-Fi networks.*

Better battery life

With Battery STAMINA Mode you have more intelligent battery management and can easily improve your standby time by four times or more*. When the screen is off, your phone automatically shuts down the battery-draining apps you don't need, then starts them up again when the screen is back on. And of course, since you don't want to miss any important reminders or notifications, you can choose which apps to keep running even when the screen is off.

** Based on testing done with default settings, default accounts and applications for Skype™ and Twitter downloaded to the phone. The more applications installed, the greater the effect of Battery STAMINA Mode.*

Entertainment audio

Xperia™ ZL comes with a high quality stereo headset. Sony MH-EX300AP headset has superior acoustic performance which helps realize sound true to the original recorded sound.

Get the most out of your music, games and films. An in-ear headset that's designed for a premium comfort fit lets you enjoy quality entertainment audio. And when a call or message comes in, you'll know.

PlayMemories Online*. Enjoy anytime, anywhere.

Where are all your favourite shots? Spread out on Facebook™, your phone and your computer? Now you can carry every picture with you, without storing them all in your phone. PlayMemories Online lets you collect all your photos and videos in one place, then relive memories wherever you are. See the perfect shot? Upload pictures automatically over Wi-Fi® from your phone camera to PlayMemories Online. Then view your photos on any device – tablet, phone, computer, or BRAVIA® TV.

** PlayMemories Online is not available in every market.*

Game on!

In the mood for a brain teaser? Or are your fingers itching to do battle? With your PlayStation™Certified smartphone, you'll have direct access to PlayStation®Store for PlayStation®Mobile *, where you can browse a catalogue of great PlayStation®Mobile games developed for PlayStation®Mobile. So however you like to play, download something today and say bye-bye to boredom.

** PlayStation® Mobile is currently available in the US, Canada, Japan, UK, France, Italy, Germany, Spain and Australia only.*

Sony Entertainment Network* – anytime, anywhere

Download a movie or TV show from Video Unlimited. Connect your smartphone to your TV and the TV launcher pops up automatically. Enjoy millions and millions of songs from Music Unlimited. Enjoy all this and more from Sony Entertainment Network, with a common sign-on ID and digital wallet through your smartphone. It's the perfect fit for a life full of entertainment.

** Sony Entertainment Network with Video Unlimited and Music Unlimited is not available in every market. Separate subscription required. Additional terms and conditions apply*

Signature features

The Sony Xperia™ ZL comes with a range of features as standard. Below is a summary of the key signature features.

Xperia™ Local connectivity

More control over your media
Using Local connectivity, you can exercise more control over how media files get transferred and stored.

Xperia™ Home screen application

The place you call Home
Customise your Home screen with widgets, shortcuts, folders, themes, wallpaper and other items. Where's best for you? Email top right? Music player bottom left? You decide. With six extensions to your Home screen, you've got plenty of space to put things where you want. Just remember to flick left or right to find them. You can also add folders in the app tray/launcher.

Facts – dimensions, weight, performance and networks

Operating system	Google™ Android™ 4.1 (Jelly Bean)
	Google™ Android™ 4.2 (Jelly Bean)
Processor	1.5 GHz Qualcomm APQ8064 + MDM9215 Quad Core
GPU	Adreno 320
Size	131.7 x 69.8 x 9.8 mm
Weight	151 grams
Available colours	Black White
SIM card	Micro SIM
Main screen	
Colours	16,777,216 colour TFT
Resolution	1920x1080 pixels
Size (diagonal)	5.0 inches
Scratch-resistant	Shatter-proof sheet on scratch-resistant glass
Input mechanisms	
Text input	On-screen QWERTY keyboard
Touch screen	Capacitive
Touch gesture	Yes – multi-touch, up to 10 fingers supported
Memory	
RAM	2 GB
Flash memory	Up to 16 GB*
Expansion slot	microSD™ card, up to 32 GB (Android™ 4.1)
	microSD™ card, up to 64 GB (Android™ 4.2)
Camera	
Camera resolution	13 MP
Digital zoom	16x
Photo light	Yes – Pulsed LED
Video recording	Yes – HD 1080p
Front Camera	Yes – HD 1080p for video chat and 2 MP for camera capture
Sensors	

Accelerometer	Yes
Proximity sensor	Yes
Magnetometer	Yes
Gyroscope	Yes
Networks	
C6506	UMTS HSPA+ 850 (Band V), 900 (Band VIII), 1700 (Band IV), 1900 (Band II), 2100 (Band I) GSM GPRS/EDGE 850, 900, 1800, 1900 LTE Band I, Band II, Band IV, Band V and Band XVII
Data transfer speeds	
GSM GPRS	Up to 70.4 kbps (download). Up to 35.2 kbps (upload).
GSM EDGE	Up to 236.8 kbps (download). Up to 118.4 kbps (upload).
UMTS HSPA cat 24(download)	Up to 42 Mbps
UMTS HSPA cat 6 (upload)	Up to 5.76 Mbps
LTE cat 3 (download)	Up to 102 Mbps
LTE cat 3 (upload)	Up to 51 Mbps
Hearing Aid Compatibility (HAC)	
M-Rating	M3
T-Rating	T3
Teletypewriter (TTY)	Yes – both HCO and VCO supported
Talk time (GSM)	Up to 10 hours**
Standby time (GSM)	Up to 500 hours**
Talk time (UMTS)	Up to 13 hours**
Standby time (UMTS)	Up to 500 hours**
Standby time (LTE)	Up to 490 hours**
Music listening time	Up to 40 hours**
Video playback time	Up to 5.5 hours**
Battery	2370 mAh (Built-in) typical 2300 mAh minimum

** Memory comprises of approximate 5 GB firmware, plus 11 GB of "Internal Storage" for downloaded applications, music, pictures and movies, and some application data. For more details about memory, see "Memory in Android™ phones" on page 21.*

*** Values are according to GSM Association Battery Life Measurement Technique as performed in controlled laboratory conditions. Actual time may vary.*

NOTE: Battery performance may vary depending on network conditions and configurations, and phone usage.

NOTE: Performance metrics measured under laboratory conditions.

Categorised feature list

Camera
13 MP
16x digital zoom
Aperture f/2.4
Auto focus
Burst Mode
HDR for both picture and video
Face detection
Flash/Pulsed LED
Flash/Photo light
Front-facing camera 2 MP (1080p video)
Geotagging
HD video recording (1080p)
Image stabiliser
Object tracking
Picture Effect
Red-eye reduction
Scene recognition
Self-timer
Send to web
Smile shutter
Sony Exmor RS™ for mobile image sensor
Superior Auto
Sweep Panorama
Touch capture
Touch focus
White balance

Music
3D surround sound (VPT)
Album art
Bluetooth™ stereo (A2DP)
ClearAudio+
Clear bass
Clear Phase™
Clear stereo
Dynamic normalizer
PlayNow™ service*
SensMe™
TrackID™ music recognition*
“WALKMAN” application
xLoud™ Experience

Internet
Bookmarks
Google Chrome™
Google Play™
Google™ search*
Google Voice™ Search*
Google Maps™ for Mobile with Street view and Latitude™*
NeoReader™ barcode scanner*
Pan & zoom
Web browser (WebKit™)

Communication
Call list
Facebook™ application*
Google Talk™ application*
Noise suppression
Polyphonic ringtones
Speakerphone
Twitter™ integration*

Messaging
Conversations
Email
Google Mail™*
Instant messaging
Multimedia messaging (MMS)
Predictive text input
Sound recorder
Text messaging (SMS)
Voice input

Design
Auto rotation
Face Unlock
Gesture input
On-screen QWERTY keyboard
Screenshot capturing
Touch screen
Wallpaper

** This service is not available in all markets.*

Entertainment

3D games
Media browser
Motion gaming
PlayStation® Certified
Radio (FM radio with RDS)
SensMe™ slideshow
Sony Entertainment Network*
TV launcher
Video streaming
YouTube™*

Organiser

Airplane mode
Alarm clock
Calculator
Calendar
Contacts
Document readers
eCompass™
Infinite button
Notes
Setup guide
Stopwatch
Timer

Connectivity

3.5 mm audio jack (CTIA)
aGPS*
Bluetooth™ 4.0 wireless technology
DLNA Certified®
GLONASS*
IR remote control
Media Go™
Media Transfer Protocol support
HDMI via MHL support
Micro USB support
Native USB tethering
NFC
Screen mirroring
PC Companion
Throw
Synchronisation via Exchange ActiveSync®
Synchronisation via Facebook™
Synchronisation via Google™
Synchronisation via SynchML™
USB charging
USB High speed 2.0 support
Wi-Fi®
Wi-Fi® Hotspot functionality

** This service is not available in all markets.*

Technologies in detail

NOTE: The information outlined below is general and levels of compliance to standards and specifications may vary between products and markets. For more information, contact Sony Mobile Developer World or your Sony contact person where applicable.

Device-to-device communications (local)

Bluetooth™ wireless technology

Bluetooth™ profiles supported	Advanced Audio Distribution Profile v1.2 Audio/Video Remote Control Profile v1.3 Handsfree Profile v1.6 (Wide band speech) Headset Profile v1.1 Object Push Profile v1.1 Phonebook Access Profile v1.0 Message Access Profile Host Interface Device Profile Health Device Profile 1.1 Generic Attribute Profile Client/Server over LE Proximity Monitor Profile over LE
Core version and supported core features	Version 4.0
Connectable devices	Products supporting at least one of the Bluetooth™ profiles. BT4.0 accessories generally require installation of a supporting application.

More information:

www.sonymobile.com/developer

www.bluetooth.com

Wi-Fi®

Supported standards	IEEE 802.11a/b/g/n and Wi-Fi® Wi-Fi Direct and Wi-Fi Protected Setup
Connectable devices	Wi-Fi® access points Wi-Fi Direct compatible devices
Frequency band	2.4 GHz/5 GHz
Data transfer rate	Up to 150 Mbit/s
Security	WEP Open Authentication WEP Shared Authentication WPA Personal and WPA2 Personal WPA Enterprise and WPA2 Enterprise EAP-SIM EAP-AKA EAP-TLS EAP-TTLS/MSCHAPv2 PEAPv0/EAP-MSCHAPv2 PEAPv1/EAP-GTC
Encryption	WEP 64 bit, WEP 128 bit, TKIP and CCMP (AES)
Power save	WMM-PS, IEEE-PS
QoS	WMM

DLNA Certified® (Digital Living Network Alliance)

Supported Device Classes	M-DMS – Mobile Digital Media Server Media Types: images, music and video Summary: The digital media server exposes the media files in your phone to a Wi-Fi® network. The files can then be accessed from other DLNA Certified® clients. +PU+ Media Types: image, video and music Summary: Play media in the phone on another device, such as a TV or computer using 2 box push technology. +PU+ is integrated in the Gallery and Music applications. M-DMP – Mobile Digital Media Player Media Types: image, video and music Summary: Play content stored on another device, for example, a server or a PC, directly on the phone. +DN+ Media Types: image, video and music Summary: Download content stored on another device, for example, a server or a PC, and play the downloaded content directly on the phone.
Supported Bearers	Wi-Fi®, Wi-Fi Direct
DRM Support	The DLNA Certified® implementation does not support DRM-protected content.

Messaging

MMS (Multimedia Messaging Service)

According to OMA Multimedia Messaging Service v1.0 + SMIL

Email

Bearer type (IP)	GPRS, EGPRS, UMTS
Character sets	BIG5 Traditional Chinese GB18030 ISO-2022-JP Japanese ISO-8859-1 ISO-8859-2 Eastern Europe ISO-8859-5 Cyrillic ISO-8859-7 Greek ISO-8859-9 Turkish ISO 8859-11 KOI8-R Cyrillic Shift_JIS Japanese USASCII UTF-16 UTF-8 Windows® 874 Windows® 1251 Cyrillic Windows® 1252 Windows® 1254 Turkish Windows® 1258 Vietnamese
Protocols	POP3 and IMAP4
Push email	Microsoft® Exchange ActiveSync® (EAS)
Secure email	SSL/TLS, both port methods (POPS/IMAPS) and START-TLS
HTML mail	Yes (read only)

More information:

http://developer.sonymobile.com/wp/

www.openmobilealliance.org

Positioning – location based services

Supported standards:

- OMA Secure User Plane Location (SUPL)
- 3GPP™ Control Plane location (incl. Emergency location)
- Qualcomm® GPSOneXtra™

Supported satellite systems:

- GPS
- GLONASS*

* NOTE*:* GPS and GLONASS are used together to calculate the position. Positioning is more robust and accurate in most conditions if both systems are active. In the conditions where the GLONASS receiver will not add any improvement, it is automatically disabled to save power. The benefits of using GLONASS are automatically available for all applications using the Satellite Positioning API (referred to "GPS Provider" in Android terminology).

Provisioning (OMA CP)

OMA CP version 1.1

Multimedia (audio, image and video)

Audio Playback	Decoder format	Supported in file format
	MP3	MP3 (.mp3), AVI (.avi, .xvid)
	AAC LC, HE-AAC v1, HE-AAC v2, AAC ELD	3GPP (.3gp), MP4 (.mp4), MKV (.mkv), MPEG-TS (.ts)
	AMR-NB, AMR-WB	3GPP (.3gp)
	General MIDI (GM)	SMF (.mid)
	Linear PCM, PCM/WAVE 8- and 16-bit	WAV (.wav), AVI (.avi), MKV (.mkv)
	Ogg vorbis	Ogg vorbis (.ogg)
	FLAC	FLAC (.flac)
Audio Recording	Encoder format	Supported in file format
	AMR-NB, AMR-WB	3GPP (.3gp), MP4 (.mp4), AMR (.amr)
	AAC-LC	3GPP (.3gp), MP4 (.mp4)
Image Playback	Decoder format	Supported in file format
	1, 4, 8, 16, 24 and 32 bpp and RLE encoded formats	BMP (.bmp)
	Single and multi-frame, bitmap mask support (GIF87a format and GIF89a format)	GIF (.gif)
	JPEG	JPEG (.jpg)
	PNG	PNG (.png)
Image Capture	Encoder format	Supported in file format
	JPEG	JPEG (.jpg)
Video Playback	Decoder format	Supported in file format
	MPEG-4 1080p (1920x1080) Advanced Simple Profile Level 5 20 Mbps at 30 fps	3GPP (.3gp), MP4 (.mp4), Matroska (.mkv), AVI (.avi, .xvid)
	H.264 1080p (1920x1080) High Profile level 4 20 Mbps at 30 fps	3GPP (.3gp), MP4 (.mp4) Matroska (.mkv), MPEG2-TS (.ts, AAC audio)
	H.263 Profile 0 Level 70	3GPP (.3gp), MPEG-4 (.mp4)
	VP8	WebM (.webm), Matroska (.mkv)

Video Recording	Encoder format	Supported in file format
	Video: H.263 Profile 0, H.264 1080p (1920x1080) High Profile Audio: AAC-LC stereo, AMR-NB	3GPP (.3gp), MP4 (.mp4)
Audio/Video Streaming	Streaming transport	RTSP, HTTP / HTTPS, HLS
DRM	DRM (Digital Rights Management) – features the rights and copy protection of downloaded content	OMA DRM 1.0 Marlin DRM

Synchronisation (OMA DS, EAS, Google Sync™)

OMA Data Synchronisation protocol versions 1.1.2 and 1.2

OMA Data Formats: vCard 2.1, vCalendar 1.0

Microsoft® Exchange ActiveSync® protocol version 2.5

Microsoft® Exchange ActiveSync® protocol version 12

Microsoft® Exchange ActiveSync® protocol version 12.1

Microsoft® Exchange ActiveSync® protocol version 14

Microsoft® Exchange ActiveSync® protocol version 14.1

Google Sync™

Related information:

www.sonymobile.com/developer

Web browser

Browser version	Android 4.1 Browser (Based on WebKit™)
Browser application	Bookmark synch Desktop mode Full page PC rendering Internet search Landscape/portrait rendering NFC link sharing Off-line reading Pan & Zoom
Search	Internet Search
Browser compliancy	CSS 2.0 CSS 2.1 CSS 3.0 DOM 2.0 DOM 3.0 HTML version. 4.0 HTML version. 5.0 JavaScript 1.7/ECMA-script 262 3rd edition WebGL 1.0 XHTML Basic version 1.0 XHTML 1.1 SVG 1.1
Supported Device API	Geo-location API Device orientation API File reader API Touch events API (including multi-touch)
Protocol compliancy	Gzip HTTP/1.1 OMA Download 1.0 TLS 1.0 and SSL 3.0

Related information:

www.sonymobile.com/developer

Memory in Android™ phones

To use Android phones efficiently, users should be aware of the different types of phone memory. This knowledge is important in order to understand, for example, where music, photos and videos are saved; how many apps can be downloaded from Google Play™; and how photos can be copied to a PC.

The below information is also of interest to developers who wants to make their programs able to make the best possible use of the resources in the phone.

Generally, all Android phones share the same basic memory setup. What differs is how much memory is available to you via the different types of memory, and whether your phone uses an external SD card or an internal memory chip. Any information specific to the particular phone model described in this White Paper is noted as such.

Types of memory

The types of memory described below are consistent with the terminology used in Sony mobile phone menus and in other content relating to 2013 Xperia™ phones:

1. Dynamic Memory (also known as RAM) is used by applications that run when the phone is turned on. The amount of Dynamic Memory influences how many applications and operating system services can run at the same time. In Android™, the operating system automatically closes applications and services that are not being used.

   However, such automatic functionality has limits. For example, if a lower amount of free RAM is available to applications after a new release of the operating system (due to increased capabilities in the system), phone speed will eventually be impacted (this is the main reason that a certain device cannot be indefinitely upgraded to newer releases of Android™).

   If you experience problems with RAM, for example, if the phone runs slower than usual or if the Home application restarts frequently when you leave an application, you should minimize the use of apps that run all the time. Such apps could include, for example, applications that frequently download social service updates. You could also consider using a static wallpaper instead of a live wallpaper.

   To see which apps and services are currently active, go to Settings > Applications > Running Services. You should have at least 50 MB, and ideally 100 MB or more, of free RAM to avoid slowdowns and application restarts.

   You should also be aware that if you update the phone to a later Android release, the load on the built-in Dynamic Memory will increase due to the addition of more features, as mentioned above. As a result, the phone may run slower after an update.

2. System Memory (also known as “System partition” or “/system”) is used for the Android OS and for most applications that are pre-loaded from the factory. This type of memory is normally locked, and can only be changed through a firmware upgrade. There is usually some free space available in this section of memory. However, since it is locked, you cannot save apps, photos or any other content to this memory. System Memory is reserved for future firmware upgrades, which almost always need more memory than the original firmware. You cannot see or influence the use of this memory.

3. Internal Storage is memory used as” working” memory. It can be compared to the C: drive on a PC or to the startup disk on a Mac.

   This memory is used to store all application downloaded from Google Play Store™ (and other sources) and their settings and data (such as emails, messages, calendar events and the like). All applications have an allocated area which no other applications can access and where the application data can be

stored.

Some games also stores content such as games music and level information outside their own designated area; and generally, any application can choose to save their data in locations of their own choosing (outside the protected application settings areas). Generally, such content is not deleted when an application is uninstalled but must be removed manually, by connecting the phone to a computer with a USB cable, or by the use of a file manager application.

Internal Storage is also used for all user content added, for example, as a result of the user taking photos with the camera, downloading media files, and performing file transfers. Typical user content includes:

- photos
- movies
- music
- downloaded documents (as email attachments, for example)

Internal Storage will tend to fill up as a result of normal usage: use of applications saving their data, downloading and installing new applications, downloading free or bought content and taking pictures and movies. Therefore, the larger this memory is from the start, the more applications you can download and use, and the more pictures and movies you can take.

If the Internal Storage starts to get full, the phone slows down, and in some cases it might no longer be possible to install more apps. You should always ensure that you have at least 100 MB of free Phone Memory. If not, you should consider removing some apps that you seldom use, or move content you do not frequently access to safe storage.

You can see approximately how much Internal Storage is free in Settings > Storage >Internal Storage. You can also view more detail about how much memory is used by applications in Settings > Applications > Manage Applications.

Please note that in Sony Mobile 2013 products, “Internal Storage” is now the union of what was previously known as “Phone Memory” (for applications and their data. “/data”) and “Internal Storage” (for user’s content, “/sdcard”). The reason for this change is to make the use of available memory more flexible, and also to enable the optional encryption of user’s content.

Memory card slot

In some products you may find both a large internal memory and a memory card reader slot. However, on the current Android platform, the card reader slot does not work in the same manner in a phone with large internal memory, as in a phone with ONLY a memory card slot.

Generally, since most applications expect only a single location of storage, such applications will not generally allow you to SAVE anything to the card (i.e. they will lack an option to choose storage location); however, some applications (for instance, the Sony Mobile “Camera” application) may actually allow you to do so. Other, for example backup applications such as the Sony Mobile “Memory” application, will by definition be configured to copy content from the Internal Storage to the external SD card.

On the other hand, when it comes to READING from an external SD Card, you will be able access content (videos, photos, music) on a memory card inserted in this slot without any special considerations since the Android system searches all available memory for content. Therefore, such products may be regarded as supporting a fourth type of memory, called “External Card”.

4. SD Card (known as "/ext_card" from a programmer's point of view, or by other names in other Android products) is the name for the removable SD memory card in all 2013 Sony Mobile products. As described above, this External Card memory is generally more limited in that any application can READ from it, but many applications cannot SAVE to this card. Only a few applications, including back-up applications and file manger applications, has the capability to save to this card.

Backing up data to different memory types
Generally, you should not save photos, videos and other personal content solely on the internal memory of a phone. If something should happen with the hardware, or if the phone is lost or stolen, the data stored on the phone's internal memory is gone forever.

In a phone where an SD card reader is the main memory, it is relatively easy to take the card out and copy all content to a PC or Mac, or to an entertainment device with a memory card slot. In a product featuring Internal Storage as the main memory, it is not possible to physically remove the memory. Instead, any critical or high-value content must either be copied to an external SD card by a special backup application, transferred to remote storage over a network (mobile or Wi-Fi), or to a computer via a USB cable.

To facilitate the transfer of data via a cable, the Xperia™ Z supports the Microsoft standard, Media Transfer Protocol (MTP), which makes it possible to easily transfer content back and forth between your phone and a Windows PC. For Apple Mac computers, a special application, BridgeforMac, is available offering built-in support for MTP; this application can be downloaded from the Xperia™ Z Support page.

Note that you do not need to back up or make a copy of applications that you have downloaded from Google Play™. They can normally be downloaded again if, once you have set up your Google account to work in a new phone phone (or a phone where the memory has been completely erased).

Note 1:
As noted above, some Android phones, including Sony Mobile devices from 2012, and Sony Ericsson devices from 2011 and earlier, do not use a single "Internal Storage" for both applications (and their data) and user content. Instead, these devices use either an external SD card for user content, or a corresponding area of internal memory to reproduce the functionality of an SD card. In such devices, there is a fixed limit between the application area ("/data") and the user content area ("/sdcard); with the result that user content can be filled, stopping the taking of new pictures for example, while there is still considerable free space in the application area; or vice versa, stopping the download and installation of new applications even though there is free memory in the content area.

Note 2:
Some devices with an integrated storage have abandoned the distinction between the application area and the content area when it comes to Factory Data Reset. As a result, there is no choice to do Factory Data Reset and preserve content; in such devices, all content is mandatorily and completely deleted from the device when a reset is performed.

In contrast, Sony Mobile has done the integration in a manner which makes it possible to preserve user content in this situation; therefore, when performing a Factory Data Reset, the default will still be to only remove applications and their data, and an option box must be checked if also all content is to be removed (as might be desirable when selling the device second-hand, for instance).

Note 3:
For a developer, it is important to note that from a programmer's point of view, the location names used to refer to the different memory areas described in Note 1 are still valid; i.e., the area used for application (/data) is still present, as is the area used for content (/sdcard).

In reality, “sdcard” is a so-called symbolic link to “/data/media”, but from inside an Android application, “/sdcard” can still be used (for instance, use “sdcard/DCIM/100Android” to find all camera images). Continuing to use /sdcard to access the content area ensures compatibility across different products and Android releases in this regard.

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